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EXAMINER

CURTIS, CRAIG

ART UNIT PAPER NUMBER

2872

DATE MAILED: 06/28/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/714,266

Applicant(s)

HAYAKAWA, SHINGO

Examiner

Craig Curtis

Art Unit

2872

Am

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-41 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-41 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 2/22/01 & 6/25/01.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: ____.

DETAILED ACTION

Foreign Priority Documents

1. Receipt of foreign priority documents, submitted under 35 U.S.C. 119, is hereby acknowledged, which documents have been placed of record in the file as Paper No. 5.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter that the Applicant regards as his invention.

2. Claims 1-41 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter that Applicant regards as the invention. Initially, the Examiner respectfully requests that Applicant substitute, where appropriate, the word *birefringent* for the word *birefringence* (emphasis added) presently recited in the claims. This request is made not only for the purpose of ensuring that the claimed subject matter of the instant invention be consistent with established terminology in the prior art, but also on grammatical grounds: namely, *birefringence* is noun, while *birefringent* is an adjective; and because nouns are modified by adjectives, not by other nouns, the phrase *birefringence plate* is nonsensical, while the phrase *birefringent plate* is not. Thus, for the sake of example, the recitation "...at least one birefringence plate which is made of a uniaxial single crystal (read: a *single uniaxial* crystal; please note the proper ordering of the words *single* and *uniaxial*) that causes birefringence of incoming rays (???) and has a refractive index difference of not less than 0.02 for ordinary and extraordinary rays...at least one birefringence plate makes

with a normal to a surface of said at least one birefringence plate.” (recited in lines 2-11 of claim1) should be changed to read as follows: “...at least one birefringent plate ~~which is made~~ of a single uniaxial crystal that causes birefringence of incoming rays (???) and has a refractive index difference of not less than 0.02 for ordinary and extraordinary rays...at least one birefringent plate makes with a normal to a surface of said at least one birefringent plate.” Not incidentally, the annotation (???) has been added to put Applicant on notice that the Examiner cannot ascertain the meaning of the “...causes birefringence of incoming rays...” portion of the above-recited limitation. More specifically, rays, incoming or outgoing, do not—and, indeed, ~~cannot--~~ be birefringent. The noun birefringence is defined as the double (or bi-) refraction of light in anisotropic materials that results in rays (typically denominated ordinary and extraordinary) traveling in two slightly different directions. Therefore, the phrase “...that causes birefringence of incoming rays and has...” should be deleted, which would result in the following: “...at least one birefringent plate ~~which is made~~ of a single uniaxial crystal ~~that causes birefringence of incoming rays and has~~ having a refractive index difference of not less than 0.02 for ordinary and extraordinary rays...at least one birefringent plate makes with a normal to a surface of said at least one birefringent plate.” In addition to **claim 1**, the “causes birefringence of incoming rays” issue also is encountered in independent **claim 16**. Also see the erroneously recited “...causes birefringence of the photographing light.” limitation in **claim 29**.

With regard to independent claim 1, the meaning of the phrase “...wherein said filter satisfies at least one of: (read: at least one of the following ranges:)...” cannot be ascertained, in that in those instances when said filter comprises but one birefringent plate, said filter can only satisfy **one**, not **at least one**, of the recited angle ranges. (Emphasis added.)

With regard to claim 3, the meaning of the limitation “wherein an orthogonal projection of an optic axis of said first birefringence [read: birefringent] plate onto an entrance or exit surface [entrance or exit surface of *what?*] and an orthogonal projection of an optic axis of said second birefringence [read: birefringent] plate onto the entrance or exit surface [again, entrance or exit surface of *what?*] point to [read: in] different directions.” cannot be ascertained. Similar indefiniteness issues arise with regard to like limitations recited in at least **claims 4, 11-13, 18, 22, 25, 26, and 33-35** (the problem being compounded by the explicit recitation of a first and a second birefringent plate in claims 12, 13, 18, 22, and 25—that is, the recitation of two plates increases the necessity of definiteness with respect to which birefringent plate said entrance and exit surfaces are to be associated—and a third birefringent plate in **claims 26, 33-35**).

And finally with regard to claim 36, proper antecedent support has not been provided for the limitation “...the plurality of birefringence [read: birefringent] plates...” recited in lines 5-6.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-5 & 22-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Woodward et al. (5,175,736) in view of *Refraction* (as set out in *The Physics Hypertextbook* @ <http://hypertextbook.com/physics/waves/refraction>).

With regard to claim 1, Woodward et al. disclose the invention as claimed—[a]n optical low-pass filter [NB: The recitation “optical low-pass filter” has not been given patentable weight because the recitation occurs only in the preamble and thus is a so-called *intended use* limitation. More specifically, a preamble is generally not accorded any patentable weight where it merely recites the purpose of a process or the *intended use* of a structure, and where the body of the claim does not depend on the preamble for completeness but, instead, the process steps or structural limitations are able to stand alone. See *In re Hirao*, 535 F.2d 67, 190 USPQ 15 (CCPA 1976) and *Kropa v. Robie*, 187 F.2d 150, 152, 88 USPQ 478, 481 (CCPA 1951).] comprising:

at least one birefringent plate (any one of plate 60, 72, and 74) made of a birefringent material, wherein said filter satisfies $61^{\circ} < \theta < 80^{\circ}$, where θ is the angle an optic axis of said at least one birefringent plate makes with a normal to a surface of said at least one birefringent plate (see col. 6, ll. 27-32: i.e., $40 \text{ plus } 30 = 70 \text{ degrees}$)—**EXCEPT FOR** explicit teachings of the following additionally recited claim limitations:

wherein said at least one birefringent plate is made of a uniaxial crystal and has a refractive index difference of not less than 0.02 for ordinary and extraordinary rays.

The use of uniaxial birefringent materials having refractive index differences of not less than 0.02 for ordinary and extraordinary rays in the optical arts, however, is notoriously old and well known. See, e.g., calomel, rutile, and zircon (high and low)--uniaxial crystals all, each having a refractive index difference [read: birefringence] of not less than 0.02 for ordinary and extraordinary rays (viz., 0.683, 0.287, 0.055, and 0.047, respectively). It would have been obvious to one having ordinary skill in the art at the time the invention was made to have prepared the birefringent plate of Woodward et al. such that be made out of a single uniaxial

crystal having a birefringence of not less than 0.02, as evidenced by the above-recited disclosures in *Refraction*, for at least the purpose of achieving a desired birefringent effect.

With regard to claim 2, the combination meets this teaching, provided, of course, that Applicant reckons birefringence, δ , as $\delta = n_o - n_e$ (in which case, lithium niobate would have a birefringence of 0.085). If this is not the manner in which Applicant reckons birefringence (i.e., if, instead, Applicant reckons birefringence as $\delta = n_e - n_o$, Applicant **MUST** explicitly disclose how lithium niobate can be used as the birefringent material recited in claim 1 and still satisfy the "...not less than 0.02..." birefringence requirement recited therein). This teaching by the combination also meets the limitations recited by Applicant in **claims 22, 23, and 25**.

With regard to claims 3 and 4, Woodward et al. disclose first and second birefringent plates (any two from among birefringent plates 60, 72, and 74 in Fig. 4; please also see col. 6, ll. 13-18 of Woodward et al., it being submitted that the orthogonal projection limitations set out in this claim are met by the birefringent plates depicted in, e.g., Fig. 4, in the same manner as that presently set out in the claims.

With regard to claim 5, please see plane parallel plates 61 and 63 in Fig. 4; also see col. 28, ll. 44-51. This teaching by the combination also meets the limitations recited by Applicant in **claim 24**.

With regard to claim 26, the combination additionally discloses a third birefringent plate. See, e.g., plate 74 in Fig. 4 of Woodward et al.

With regard to claim 27, please above, esp. Woodward et al.

4. Claims 6-15, and 29-41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Woodward et al. (5,175,736) in view of *Refraction* (as set out in *The Physics Hypertextbook* @ <http://hypertextbook.com/physics/waves/refraction>), as applied above to claims 1-5, and further in view of Oono (6,724,531).

With regard to claim 6, the combination discloses the claimed invention as set forth above **EXCCEPT FOR** an explicit teaching of an image sensing element inserted in an optical path of photographing light guided to said image sensing element.

Oono, however, discloses an image sensing element (20 in Fig. 1) in front of which is inserted an optical low-pass filter (10) in an optical path of photographing light guided to said image sensing element. See Fig. 1. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the invention of the combination such that it further include an image sensing element, as explicitly taught by Oono, for at least the purpose of, for example, gauging proper system alignment.

With regard to claims 7-15, although the combination fails to disclose explicitly wherein, e.g., said image sensing element and said optical low-pass filter are integrated, wherein said optical low-pass filter is directly adhered to said image sensing element, etc., it would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the invention of the combination such that, e.g., said image sensing element and said optical low-pass filter be integrated, for at least the purpose of decreasing reflection losses, because it has been held that forming in one piece an article that has formerly been formed in two pieces and put together involves only routine skill in the art. *Howard v. Detroit Stove Works*, 150 U.S. 164 (1893).

With regard to claims 29-41, please see the teachings by the combination of the limitations recited in these claims as set forth hereinbefore.

5. Claims 16-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Oono (6,075,581) in view of Woodward et al. (5,175,736) and *Refraction* (set out in *The Physics Hypertextbook* @ <http://hypertextbook.com/physics/waves/refraction>), and Shirochi (6,075,581).

With regard to claim 16, Oono discloses the invention as claimed—an image sensing unit comprising: an image sensing element having a rectangular image sensing surface (20 in Fig. 1); and

at least one birefringent plate (any one plate from among birefringent plates 4, 5, and 6) that is inserted in an optical path of photographing light guided to said image sensing element and is made of birefringent material—**EXCEPT FOR** explicit teachings of the following additionally recited limitations:

wherein said at least one birefringent plate is made of a single uniaxial crystal having a refractive index difference (read: birefringence) of not less than 0.02 for ordinary and extraordinary rays (please see, however, the teachings set forth above with respect to same by Woodward et al. in view of *Refraction*);

wherein said unit satisfies:

$$0.015 < p/d < 0.045,$$

where d is the thickness of said at least one birefringent plate, and p is the pixel pitch of the image sensing surface is a long side direction.

Shirochi, however, provide an explicit teaching of an image sensing unit (see Fig. 4) that satisfies $0.015 < p/d < 0.045$, where d is the thickness of said at least one birefringent plate, and p is the pixel pitch of the image sensing surface in a long side direction. Please see col. 9, ll. 56-61, where d is taught as being 0.453 mm and p as being 17.5 μm , resulting in a p/d ratio of 0.0386. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the invention of Oono in view of Woodward et al. and Refraction such that said unit satisfy the recited range of $0.015 < p/d < 0.045$, as taught by Shirochi, for at least the purpose of suppressing aliasing (aka Moiré) effects.

With regard to claim 17, the combination meets the limitations recited in this claim. See above, esp. col. 6, ll. 27-32 in the Woodward et al. reference.

With regard to claim 18, please see above, esp. birefringent plates 60, 72, and 74 in Fig. 4 of the Woodward et al. reference.

With regard to claims 19-21, please see the above-recited teachings of the limitations respectively recited in these claims by the references of the combination.


Contact Information

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Craig Curtis whose telephone number is (571) 272-2311. The examiner can normally be reached on Monday-Friday, 9:00 A.M. to 6:00 P.M..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Drew A. Dunn can be reached on (703) 308-1687. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

C.H.C.
Craig H. Curtis
Group Art Unit 2872
18 June 2004



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